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09/821,452	04/04/2001	Akihiro Maenaka	P107314-0002	7803

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EXAMINER	
TUCKER, WESLEY J	
ART UNIT	**PAPER NUMBER**
2623	5

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/821,452	Applicant(s) MAENAKA ET AL.	
	Examiner Wes Tucker	Art Unit 2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 April 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-32* is/are rejected.

7)☒ Claim(s) *3, 4, 7, 8, 11-14, 16, 19-21, 23, 26-28, 31, and 32* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 April 2001* is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 3, 5, 6, 18, 22, and 24 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent 5,886,745 to Muraji et al.

With regard to claim 1, Muraji discloses an image interpolating method for interpolating a pixel at an intermediate position between a first original pixel and a second original pixel adjacent to the first original pixel (abstract).

Muraji further discloses a first step of calculating an edge component for judging whether or not an interpolated pixel exists in the vicinity of an edge position of an original image data (column 4, lines 15-18).

Muraji further discloses a second step of finding a range where pixel data on the interpolated pixel is settable on the basis of the calculated edge component and pixel data on the first and second original pixels (column 15, lines 26-43). Here Muraji explains how the edge detection and slope detection is used to determine the value or range of values that an interpolated pixel will have.

Muraji also discloses a third step of selecting a plurality of sets of opposed pixels between which the interpolated pixel is sandwiched diagonally (Fig. 6 elements a-n), and finding, for each of the sets, the pixel data on the interpolated pixel in a case where a correlation value represented by

the sum of the absolute values of the differences between the pixel data on the interpolated pixel and pixel data on the opposed pixels is the minimum in the range where the pixel data on the interpolated pixel is settable and the minimum correlation value (column 15, lines 50-60).

Muraji further discloses a fourth step of finding the pixel data on the interpolated pixel on the basis of the pixel data on the interpolated pixel in the case where the correlation value is the minimum and the minimum correlation value which are found for each of the sets (column 15, lines 60-63).

With regard to claim 2, Muraji discloses the image interpolating method according to claim 1, characterized in that when an original pixel adjacent to the first original pixel and opposite to the second original pixel is taken as a third original pixel, and an original pixel adjacent to the second original pixel and opposite to the first original pixel is taken as a fourth original pixel, the edge component is calculated on the basis of pixel data on the first to fourth original pixels at the first step (Fig. 6, elements d, e, k, and l).

With regard to claim 3, Muraji discloses the image interpolating method according to claim 2, characterized in that letting dl be the pixel data on the first original pixel, d2 be the pixel data on the second original pixel , d3 be the pixel data on the third original pixel, and d4 be the pixel data on the fourth original pixel , an edge component E is calculated on the basis of an equation for operation E - -d3 + dl + d2 - d4 (column 29, lines 10-25). Here Muraji discloses taking the difference of opposing pixels in order to obtain an equivalent edge calculation.

With regard to claim 5, Muraji discloses the image interpolating method according to claim 1, characterized in that letting x be the pixel data in the range found at the second step, and da and db be respectively the pixel data on the two original pixels composing one set of opposed pixels, a

correlation value L corresponding to the set is calculated (column 15, lines 45-55). Here Muraji discloses taking the absolute value of the difference of the opposed pixels where the minimum difference is considered to have the highest correlation.

With regard to claim 6, Muraji discloses the image interpolating method according to claim 1, characterized in that the fourth step comprises the steps of selecting the minimum of the minimum correlation values found for the sets at the third step, extracting the pixel data on the interpolated pixel in a case where the selected minimum of the minimum correlation values is given, determining, when the number of minimums of the minimum correlation values is one, the pixel data on the interpolated pixel in a case where the minimum of the minimum correlation values is given as the pixel data on the interpolated pixel, and determining, when there are a plurality of minimums of the minimum correlation values, the average of the pixel data on the interpolated pixel in a case where the minimums of the minimum correlation values are respectively given as the pixel data on the interpolated pixel (column 16, lines 5-12). Here Muraji discloses taking the average of the pixel data when a single minimum cannot be determined.

With regard to claim 18, Muraji discloses an image interpolating method for interpolating a pixel at a central position among four original pixels comprising a first original pixel and a second original pixel which are adjacent to each other on the right and left sides, a third pixel adjacent to the first original pixel on the lower side, and a fourth pixel adjacent to the second original pixel on the lower side (Fig. 27).

Here the method described is interpreted in regard to Figs. 8 and 9. Muraji determines a left and right edge using multiple pixel locations, and then determines the overlap between the two

edges. This area is considered a line. Muraji further discloses the pixel configuration in Fig. 27 and suggests the use of multiple pixels in the process (column 18, lines 5-15).

With regard to claim 22, Muraji discloses the image interpolating method according to claim 18, characterized in that the seventh step comprises the steps of selecting the minimum of the minimum correlation values found for the sets at the sixth step, extracting the pixel data on the interpolated pixel in a case where the selected minimum of the minimum correlation values is given, determining, when the number of minimums of the minimum correlation values is one, the pixel data on the interpolated pixel in a case where the minimum of the minimum correlation values is given as the pixel data on the interpolated pixel, and determining, when there are a plurality of minimums of the minimum correlation values, the average of the pixel data on the interpolated pixel correlation values are respectively given as the pixel data on the interpolated pixel (column 16, lines 5-12). Here Muraji discloses taking the average of the pixel data when a single minimum cannot be determined.

With regard to claim 24, Muraji discloses the image interpolating method according to claim 18, characterized in that the seventh step comprises the steps of selecting the minimum of the minimum correlation values found for the sets at the sixth step, extracting the pixel data on the interpolated pixel in a case where the selected minimum of the minimum correlation values is given, determining, when the number of minimums of the minimum correlation values is one, the pixel data on the interpolated pixel in a case where the minimum of the minimum correlation values is given as the pixel data on the interpolated pixel, and selecting, when there are a plurality of minimums of the minimum correlation values, the pixel data obtained from opposed pixels in closest proximity to the interpolated pixel out of the pixel data on the interpolated pixel in a case where the minimums of the minimum correlation values are respectively given, and determining, when the number of the selected

pixel data is one, the pixel data as the pixel data on the interpolated pixel , while determining, when the number of the selected pixel data is two, the average of the pixel data as the pixel data on the interpolated pixel (column 16, lines 5-12). Here Muraji discloses taking the average of the pixel data when a single minimum cannot be determined.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 9, 10, 11, 15, 17, 25, 29, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of U.S. Patent 5,886,745 to Muraji et al. and U.S. Patent 6,192,158 to Abousleman.

With regard to claim 9, Muraji discloses an image interpolating method for interpolating a pixel at an intermediate position between a first original pixel and a second original pixel adjacent to the first original pixel (abstract).

Muraji discloses a first step of calculating an edge component for judging whether or not an interpolated pixel exists in the vicinity of an edge position of original image data (column 4, lines 15-18).

Muraji does not disclose a second step of correcting the calculated edge component on the basis of a predetermined pseudo noise component. Abousleman discloses using predetermined pseudo noise component for use with a two-dimensional image signal (column 3, lines 5-15). Abousleman teaches that since the pseudo noise can be pre-computed and stored, pre-filtering and post-filtering can be easily carried out. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use predetermined pseudo-noise components to correct two-dimensional images such as edge components in order to easily perform pre and post filtering.

Muraji discloses a third step of finding a range where pixel data on the interpolated pixel is settable on the basis of an edge component after the correction and pixel data on the first and second original pixels (column 15, lines 26-43).

Muraji discloses a fourth step of selecting a plurality of sets of opposed pixels between which the interpolated pixel is sandwiched diagonally (Fig. 6 elements a-n), and finding, for each of the sets, the pixel data on the interpolated pixel in a case where a correlation value represented by the sum of the absolute values of the differences between the pixel data on the interpolated pixel and pixel data on original pixels in the vicinity of the opposed pixels is the minimum in the range where the pixel data on the interpolated pixel is settable and the minimum correlation value (column 15, lines 50-60).

Muraji discloses a fifth step of finding the pixel data on the interpolated pixel on the basis of the pixel data on the interpolated pixel in the case where the correlation value is the minimum and the minimum sets (column 15, lines 60-63).

With regard to claim 10, Muraji discloses the image interpolating method characterized in that where an original pixel adjacent to the first original pixel and opposite to the second original pixel is taken as a third original pixel, and an original pixel adjacent to the second original pixel and opposite

to the first original pixel is taken as a fourth original pixel, the edge component is calculated on the basis of pixel data on the first to fourth original pixels at the first step (Fig. 6, elements d, e, k, and l).

With regard to claim 11, Muraji discloses the image interpolating method characterized in that letting dl be the pixel data on the first original pixel, d2 be the pixel data on the second original pixel, d3 be the pixel data on the third original pixel, and d4 be data on the fourth original pixel, an edge component E is calculated on the basis of an equation for operation E= - d3 + d1 + d2 - d4 (column 29, lines 10-25). Here Muraji discloses taking the difference of opposing pixels in order to obtain an equivalent edge calculation.

With regard to claim 15, Muraji discloses the image interpolating method characterized in that the fifth step comprises the steps of selecting the minimum of the minimum correlation values found for the sets at the fourth step, extracting the pixel data on the interpolated pixel in a case where the selected minimum of the minimum correlation values is given, determining, when the number of minimums of the minimum correlation values is one, the pixel data on the interpolated pixel in a case where the minimum of the minimum correlation values is given as the pixel data on the interpolated pixel, and determining, when there are a plurality of minimums of the minimum correlation values, the average of the pixel data on the interpolated pixel in a case where the minimums of the minimum correlation values are respectively given as the pixel data on the interpolated pixel (column 16, lines 5-12). Here Muraji discloses taking the average of the pixel data when a single minimum cannot be determined.

With regard to claim 25, Muraji discloses all the steps except the third step. Refer to discussions for claims 1, 9, and 18. Muraji does not discloses the third step of respectively correcting

the calculated first and second edge components on the basis of predetermined pseudo noise components. Abousleman discloses using predetermined pseudo noise component for use with a two-dimensional image signal (column 3, lines 5-15). Abousleman teaches that since the pseudo noise can be pre-computed and stored, pre-filtering and post-filtering can be easily carried out. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use predetermined pseudo-noise components to correct two-dimensional images such as edge components in order to easily perform pre and post filtering.

With regard to claim 29, Muraji discloses the image interpolating method characterized in that letting x be the pixel data in the range set at the seventh step, and da and db be respectively the pixel data on the two original pixels composing one set of opposed pixels, a correlation value L corresponding to the set is calculated (column 15, lines 45-55). Here Muraji discloses taking the absolute value of the difference of the opposed pixels where the minimum difference is considered to have the highest correlation.

With regard to claim 30, Muraji discloses the image interpolating method according to claim 25, characterized in that the eighth step comprises the steps of selecting the minimum of the minimum correlation values found for the sets at the seventh step, extracting the pixel data on the interpolated pixel in a ease where the selected minimum of the minimum correlation values is given, determining, when the number of minimums of the minimum correlation values is one, the pixel data on the interpolated pixel in a case where the minimum of the minimum correlation values is given as the pixel data on the interpolated pixel, and determining, when there are a plurality of minimums of the minimum correlation values, the average of the pixel data on the interpolated pixel in a case where the minimums of the minimum correlation values are respectively given as the pixel data on the

interpolated pixel (column 16, lines 5-12). Here Muraji discloses taking the average of the pixel data when a single minimum cannot be determined.

Allowable Subject Matter

Claims 4, 7, 8, 12-14, 16, 19-21, 23, 26-28, 31, and 32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Prior Art

Other prior art considered pertinent but not relied upon is as follows:

U.S. Patent 4,985,764 to Sato

U.S. Patent 6,262,773 to Westerman

U.S. Patent 5,832,143 to Suga et al.

U.S. Patent 5,410,356 to Kikuchi et al.

U.S. Patent 6,118,488 to Huang

U.S. Patent 6,263,120 to Matsuoka

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wes Tucker whose telephone number is 703-305-6700. The examiner can normally be reached on 9AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703)308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Wes Tucker
2-13-2004

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